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Measurement of stain removal in vitro: a comparison of two instrumental methods.

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Abstract

AIM: The aim of this study was to compare an established spectrophotometrical approach for the measurement of stain removal in vitro with a new digital image analysis system.

METHOD: Eighteen acrylic blocks were stained by cycling them through human saliva (2 min), chlorhexidine (2 min) and tea (1 h), rinsed with deionized water and left to air dry. The absorbance of each block was then measured at 395 nm using a single-beam spectrophotometer. The lightness (L-value) of the stained blocks (after a baseline correction) was measured using digital image analysis. Image acquisition and L-values were obtained using Adobe Photoshop software. The stain removal ability of two whitening toothpastes and deionized water was tested by immersing each stained block in a test slurry (15 g paste/60 ml deionized water) for 1 min, rinsing and finally left to air dry. This cycle was repeated until the blocks had 5 min exposure to the slurry. Absorbance values from spectrophotometry and L-values by image analysis were obtained after each cycle.

RESULTS: Fleiss' coefficient of reliability for intra-operator repeatability of the image analysis system and spectrophotometry was 0.999 for both methods which shows excellent reliability. Pearson's correlation coefficients for the two methods (stain build-up) were 0.976. Test products A, B and C gave correlations of 0.962, 0.998 and 0.817 respectively (stain removal), significant at the 0.01 level.

CONCLUSION: The image system is a reliable alternative measurement method validated here against spectrophotometry for stain removal in vitro, and can provide full colour measurement.

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